

**Tuesday**  
**Nov. 27<sup>th</sup>**  
**At 3:45pm**



# Neutron Star Droplets and the Quarks Within

## Abstract:

Neutron stars are one of the densest strongly-interacting many-body systems in our universe. A main challenge in describing the internal structure and dynamics of neutron stars stems from our current lack in understanding the short-ranged part of the nuclear interaction and its relation to the underlying quark-gluon substructure of nuclei.

In this talk I will present new results from high-energy electron scattering experiments that probe the short-ranged part of the nuclear interaction via the hard breakup of Short-Range Correlations (SRC) nucleon pairs. As the latter reach densities comparable to those existing in the outer core of neutron stars, they represent 'neutron stars droplets' whose study can shed new light to the dynamical structure of neutron stars. Special emphasis will be given to the effect of SRCs to the behavior of protons in neutron-rich nuclear systems and how it can impact the cooling rates and equation of state of neutron stars. Pursuing a more fundamental understanding of such interactions, I will present new measurements of the internal quark-gluon sub-structure of nucleons and show how its modification in the nuclear medium relates to SRC pairs and short-ranged nuclear interactions.

Given time I will also discuss the development of new effective theories for describing short-ranged correlations, the way in which they relate to experimental observables, and the emerging universality of short-distance and high-momentum physics in nuclear systems.

**CYCLOTRON  
COLLOQUIUM**

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Room 228

Refreshments will be  
served at 3:30pm



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